

## **CLAIMS**

1) A method of repairing a leaking, damaged or weakened area in a pipeline (20) section characterized in that the method includes:

- a) removing rust, old coating and other unwanted surface blemishes on the leaking, damaged or weakened surface area and the surface beyond the leaking, damaged or weakened surface portion of the pipeline (20);
- b) wrapping the leaking, damaged or weakened surface portion of the pipeline referred in step (a) above by having at least one layer of reinforced composite wrap material (21);
- c) allowing the reinforced composite wrap material (21) to cure;
- d) enclosing total surface areas referred to in step (a) with two half oversized steel sleeves (22);
- e) sealing terminal annulus ends of sleeves ;
- f) removing non-gaseous matter in annular chamber (25) formed by sleeves (20), pipe and seals formed in step (e);
- g) introducing a load bearing epoxy or cementitious grout (29) or a combination of both into the annular chamber (25);
- h) allowing the load bearing epoxy or cementitious grout to cure.

2) A method of repairing a leaking, damaged or weakened area in pipeline (20) section as claimed in claim 1 wherein in step (a) the surface areas are grit blasted.

3) A method of repairing a leaking, damaged or weakened area in pipeline (20) section as claimed in claim 1 wherein the reinforced composite wrap material (21) consists of fiber reinforced material pre-impregnated with a resin that can be activated by salt or fresh water for underwater applications or UV or catalyst cured for above water applications.

- 4) A method of repairing a leaking, damaged or weakened area in pipeline section as claimed in claim 1 wherein the reinforced composite wrap (21) is wrapped in a spiral manner on the external surface of the pipeline (20).
- 5 5) A method of repairing leaking, damaged or weakened area in pipeline section as claimed in claim 1 wherein the one of the oversized steel (22) sleeves include an inlet port (16) and outlet port (18) or wherein one of the oversized steel sleeve includes an inlet and other mating pair oversized steel sleeve includes an outlet port.
- 10 6) A method of repairing leaking, damaged or weakened area in pipeline (20) section as claimed in claim 1 wherein the terminal annulus ends are sealed by either using a fast curing resin or elastomeric material to form a hermetic seal.
- 15 7) A method of repairing leaking, damaged or weakened area in pipeline (20) section as claimed in claim 1 wherein in step (f) the non-gaseous matter includes water or sea water.
- 20 8) A method of repairing leaking, damaged or weakened area in pipeline as claimed in claim 1 wherein the non-gaseous matter is removed by flushing the non-gaseous matter with fresh water followed by flushing with inert gas or atmospheric air.
- 25 9) A method of repairing a leaking, damaged or weakened area in pipeline (20) as claimed in claim 1 wherein at least one wear plate (23) is placed between the pipeline (20) and the reinforced composite wrap material (21).
- 30 10) A method of repairing a leaking, damaged or weakened area in pipeline (20) as claimed in claim 1 wherein the terminal annulus ends are sealed by hermetically securing a pair of terminator bodies (45) to a pair of flange bodies (32), said flange bodies integral to the two half oversized steel sleeves (20).

11) A method of repairing a leaking, damaged or weakened area in pipeline (20)  
as claimed in claim 10 wherein two semi-circular graphite bodies (56) with  
angular cut terminal ends are introduced between the pair of terminator bodies  
5 (45) and the pair of flange bodies (32) to form a circular ring.

12) A method of repairing a leaking, damaged or weakened area in pipeline (20)  
as claimed in claim 10 wherein the pair of terminator bodies (45) are  
compressed against the pair of flange bodies (24) by means a plurality of nuts  
10 and bolts (58).

13) A method of repairing a leaking, damaged or weakened area in pipeline (20)  
as claimed in claims 12 and 13 wherein a plurality of metallic rings (60, 62,  
64) are placed along the peripheral surface of the graphite bodies (56) now  
15 formed into a circular ring to prevent any extrusion of the graphite when  
compressed.

14) A means to seal terminal end of two half oversized sleeves (22) positionable  
on the external circumferential side of pipes (20) comprising of a pair of  
20 flange bodies (24) and a pair of terminator bodies (45) wherein the flange  
bodies (24) are integral to the two half oversized sleeves (22);  
wherein each flange body (24) includes a semi-circular collar (34) with a  
plurality of bores (40) thereon, a wing with an aperture and a semi-circular lip  
(42);  
25 wherein each terminator body (45) includes a semi-circular collar (46) with a  
plurality of bores (48) thereon, a wing with an aperture semi-circular recess  
(54) dimensioned and configured to receive the semi-circular lip (42); and  
wherein two semi-circular graphite bodies (56) are introduceable into the  
semi-circular recess (54) and two flange bodies and the two terminator bodies  
30 are securable together and the terminator body (45) is thereafter securable  
against the flange body (24) by the tightening of nuts and bolts introduced  
between the bores (36, 48) on the flange body and terminator body.

15) A means to seal the terminal end of two half oversized sleeves as claimed in claim 14 wherein each of the two oversized sleeves includes on each side a flange (24) with serrated strip (26).

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16) A means to seal the terminal ends of two half oversized sleeves as claimed in claim 14 wherein terminator bodies include a semi-circular lip instead of a semi-circular recess, and the flange bodies include a semi-circular recess instead of a semi-circular lip.

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17) A means to seal the terminal ends of two half oversized sleeves as claimed in claim 14 wherein a graphite strip (56) is introduceable within the semi-circular recess (54).

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18) A means to seal the terminal ends of two half oversized sleeves as claimed in claim 14 wherein at least one circular metallic clip is positionable in contact with the two semi-circular graphite bodies to prevent leakage of graphite outside the terminator bodies when subjected to compression pressure.

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19) A means to seal the terminal end of two half-oversized sleeves as claimed in claim 15 wherein a strip of teflon (PTFE) is placed between the serrated strips (26) before the flanges are secured by nuts and bolts.

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